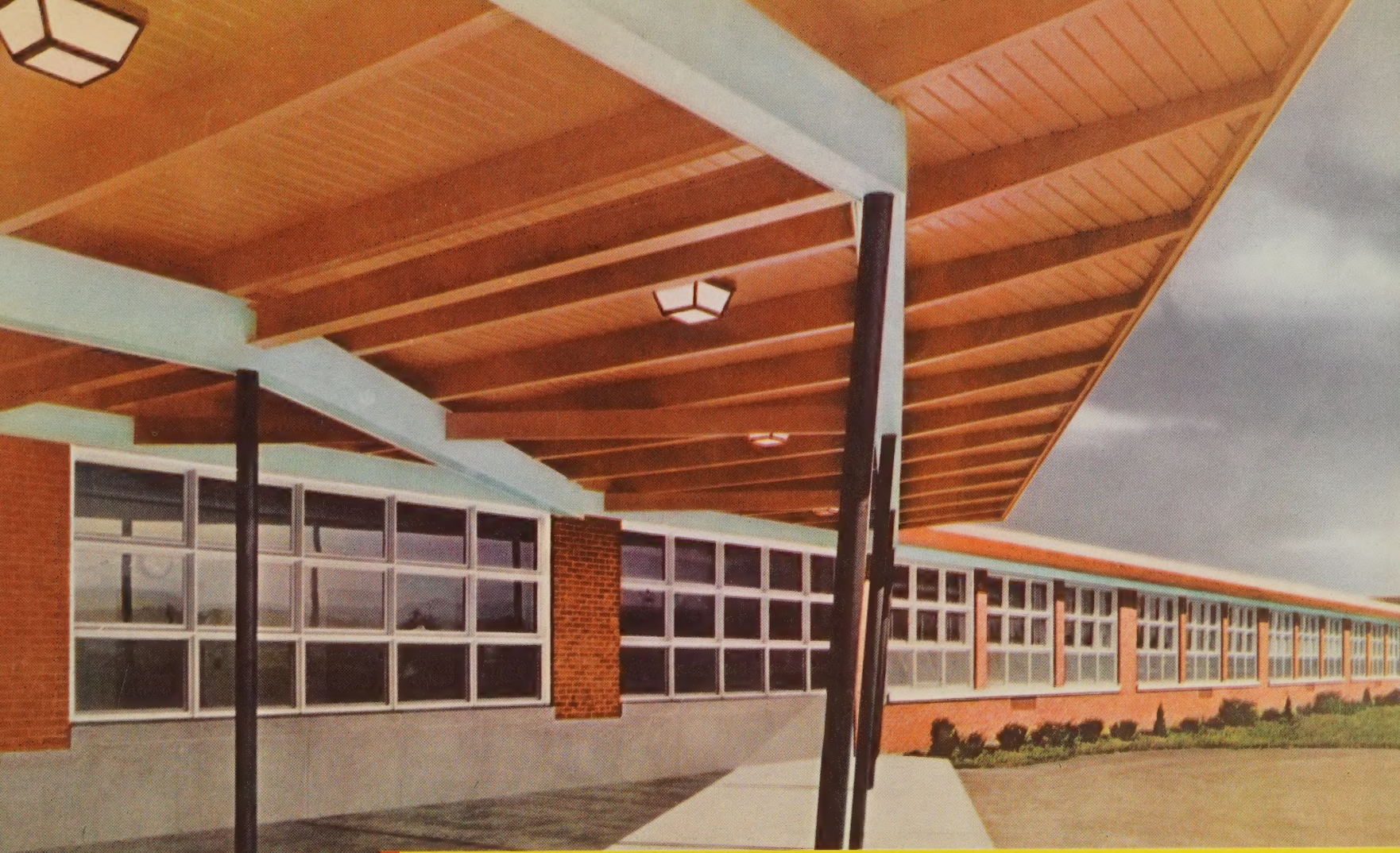

SCHOOL CONSTRUCTION

with RILCO Laminated Wood

RILCO
WORKS WONDERS WITH WOOD

Only LAMINATED WOOD offers so many advantages

If a new product were developed possessing all the advantageous properties of wood, it would be called a miracle material. Modern Rilco production facilities combine with reliable engineering to produce from wood, the oldest building material known to man, a modern structural product of strength and beauty.

Rilco arches, beams and trusses are laminated from kiln dried West Coast Douglas Fir bonded with structural glues stronger than the wood itself. Rilco roof supports are available in a variety of shapes and sizes to meet every building requirement.

Rilco Deck of nominal 2″, 3″ or 4″ thicknesses spans between primary roof supports to provide sheathing, insulation and a beautiful interior finish all in one operation.

APPEARANCE: The natural beauty and distinctive appearance of fine wood in Rilco members add warmth and beauty to classrooms, gymnasiums and auditoriums. Rilco laminated members may be left natural, stained, blonded or painted. They eliminate the expense of hiding framing by adding false ceilings, encasing members or other concealment. No other material compares in architectural and decorative possibilities.

STRENGTH: Pound for pound Rilco laminated wood members are stiffer and stronger than other common building materials in practically all important structural properties. Engineered timber is the only common structural material having a great capacity for absorbing impact and temporary overloads without encroachment on the factor of safety.

ECONOMY: Timber construction has historically been recognized as the most economical type of construction. Precision factory fabricated laminated wood members arrive at the job-site shaped, cut to length, drilled and fabricated for connection hardware furnished. As costly on the job cutting and fitting are eliminated, erection time and cost are reduced. This results in significant dollar savings as regular job-site labor and equipment can perform these operations.

FIRE SAFETY: Based on standard fire temperatures of the American Society for Testing Materials, temperature of 1100°F. is reached within six minutes. At this temperature certain structural metals have less than one-half of their normal tensile strength, and at 1700°F. they will not support the dead weight of the structure. Laminated wood structural members, being of relatively large cross-section, lose their strength only in proportion to the degree of charring under fire temperatures. Penetration tests on wood exposed to standard fire temperatures show that in general wood chars and burns at the rate of about one inch in depth in 33 minutes. This ability not to quickly lose strength under high temperatures allows time to evacuate the building, and for firemen to extinguish the fire and protect the structure.

INSULATION: Wood itself is an excellent insulator against transmission of both heat and electricity. It does not induce condensation in humid atmospheres. The inherent insulation of nominal 4″ Rilco Deck is usually sufficient to eliminate need of additional insulation materials.

MAINTENANCE: The service life of Rilco members, safe-guarded through qualified engineered design and expert fabrication, is virtually one of complete permanence. Wood is chemically inert, and under normal conditions is not subject to chemical change, nor does it rust, corrode, snap, melt or vibrate. It actually mellows and becomes more beautiful with age. Rilco members have no flanges or other dust collecting ledges.

BASIC FORMS

FLAT BEAMS

TAPERED BEAMS

PITCHED BEAMS

RILCO DECK

CANTILEVERED OVERHANG

CONTINUOUS MULTI-CURVED BEAM

BOWSTRING TRUSS

BOOMERANG ARCH

RADIAL ARCH

UTILITY ARCH

COVER ILLUSTRATION: Salem Township Elementary School, East Berwick, Pennsylvania

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A few things to consider in SCHOOL PLANNING

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SIZE OF AREAS

Elementary—Minimum 22 x 30 x 12 ft., exclusive of storage areas; recommended 23 x 30 x 12 ft. For classrooms with wardrobe at one side of room, a minimum width of 23 ft. 6 in. must be maintained. Allow 16 sq. ft. of total floor area for each pupil.*

Secondary—(a) Enrollment of 50 to 400: The following equation, based upon the correlation of total daily classes to enrollment as determined by investigation, will determine with relative accuracy the necessary number of areas required for general instruction:

$$\text{Total areas} = \frac{\dfrac{\text{Enrollment} + 12}{8}}{\text{No. daily recitation periods}}$$

When the quotient is a mixed number, it should be raised to the next higher integer. A recommended distribution of these required areas into small (20-pupil capacity), medium (30-pupil capacity) and large (40-pupil capacity) follows:

NUMBER OF AREAS	SMALL	MEDIUM	LARGE
3	1	1	1
4	2	1	1
5	2	2	1
6	2	2	2
7	3	2	2
8	3	3	2
9	3	3	3
10	3	4	3

(b) Enrollment above 400: The number of nonspecial rooms needed may be determined with the following formula:

$$\text{Req'd areas} = \frac{\dfrac{\text{Enrollment} + 20}{10}}{\text{No. daily recitation periods}}$$

In schools of this size, there should never be more than 3 small recitation areas, 22 x 15 ft. or 22 ft. x 17 ft. 6 in. The remaining areas should be approximately one-third large and two-thirds medium. In the larger schools above 1,500 enrollment, the medium areas should have a pupil capacity of 35 instead of 30.

For the size of required areas allow 16.5 sq. ft. per pupil. A minimum instruction area is suggested as 15 x 22 ft. Ceiling heights should be 12 ft.*

Aisles next to walls should be 30 in. wide; intermediate aisles at least 18 in.

ORIENTATION

Sunlight—East preferred; west next preferred; south permissible, but not recommended; north very rarely, except for art rooms.

Prevailing Winds—Classrooms should be protected as much as possible from prevailing winds bringing discomfort either of heat or cold. This can be done both through building design, building placement on the site, and through protective landscaping.

Site Exposure—Classrooms should be oriented as much as possible to shut out objectionable views.

Entrances and Stairways—No classroom should be located more than 100 ft. from an outside exit, or, if located above the first floor, more than that distance from the stairway leading directly to an outside exit.

Auditorium and Gymnasium—Free circulation of pupils from classrooms to these areas is essential to good administration; but these areas should be either so isolated or so soundproofed that activities carried on in them do not disturb pupils in the classrooms.

*Recommended by the National Council on Schoolhouse Construction

FURNISHINGS AND EQUIPMENT

Elementary—The trend in education has for some time been toward individual instruction coupled with workroom activity, as against the old form of textbook recitation. This leads to a demand for a type of classroom furniture that will permit more freedom and activity. Easily movable furniture is indispensable; many schools are being equipped throughout with the flat-top table and separate chair, which may be arranged in any order for any type of work or activity.

The classroom should provide space, preferably in an alcove at the rear of the room, for a large table that may be used for group problems, either book study or handicraft projects. This alcove should be part of a space 6 to 8 ft. deep, with wardrobe space off one end, and storage space off the other end. This space is additional to the required classroom areas already given.

Secondary—In the large rooms, individual desks or flat-top tables and chairs should be provided, but in the medium and small-sized rooms, tablet-arm chairs with space for a few books underneath serve best, and permit full utilization of the room without too much crowding of the furniture.

Blackboards of either slate or glass should be provided at front and side of each room: length—from 30 to 39 ft., not more than 42 in. wide; height of chalk trough—30 to 36 in.

LIGHTING

The window lighting of the classroom should be unilateral through a bank of windows on one of the long sides of the room, preferably at the left of the pupils when they are seated in formal arrangement. The glass area of these windows should equal one-fifth of the floor area, unless the placement of the windows is exceptionally favorable, when a glass area equal to one-sixth of the floor area may be adequate.

It is generally accepted that the top of the window should be not more than 1 ft. from the ceiling to the upper edge of the daylight opening, the forward window not nearer the forward end of the room than 4 ft., and the separation of the window units not greater than 28 in. from glass line to glass line.

Every classroom should be thoroughly equipped with adequate electric outlets for illumination by electric luminaires either located in or suspended from the ceiling of the classroom. The system of lighting may be of the general diffusing type employing suspended fixtures with opalescent globes of ample size, or semidirect system, or the indirect system. The preferable pattern for the location of these lights consists of two rows of lights parallel to the major axis of the room, each row having three ceiling outlets. Each row should be controlled by separate wall switches. If the diffusing type of fixture is used, it should not be hung so low that it tends to become a glare spot in the pupils' general range of vision. The intensity of the surface of the luminaire will depend largely on the size of the inclosing globe and the power of the luminaire within. Location of the extra suspending fixture over the teacher's desk should be avoided. One or more convenience outlets should be provided in every classroom for picture projectors.

For artificial illumination, the wattage to be employed in the lamps of the fixtures should be equivalent to 2 watts per sq. ft. of floor area when direct or diffusing luminaires are used. With the lighting equipment and the walls and ceilings in fairly good condition, this power should give very good results. The lamp power for semi-indirect and indirect must be considerably higher. Most recent recommendation is: 15 foot-candles on work surfaces.**

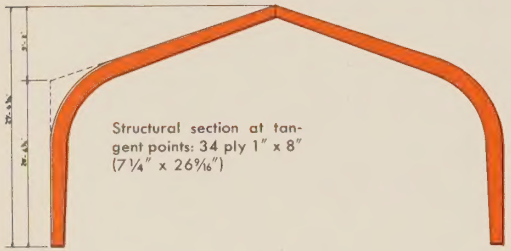
**See American Recommended Practice of School Lighting.

BUCK'S HILL SCHOOL

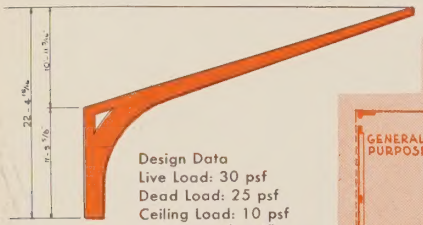
WATERBURY, CONNECTICUT

Architect: Francis L. S. Meyers, Stamford, Connecticut

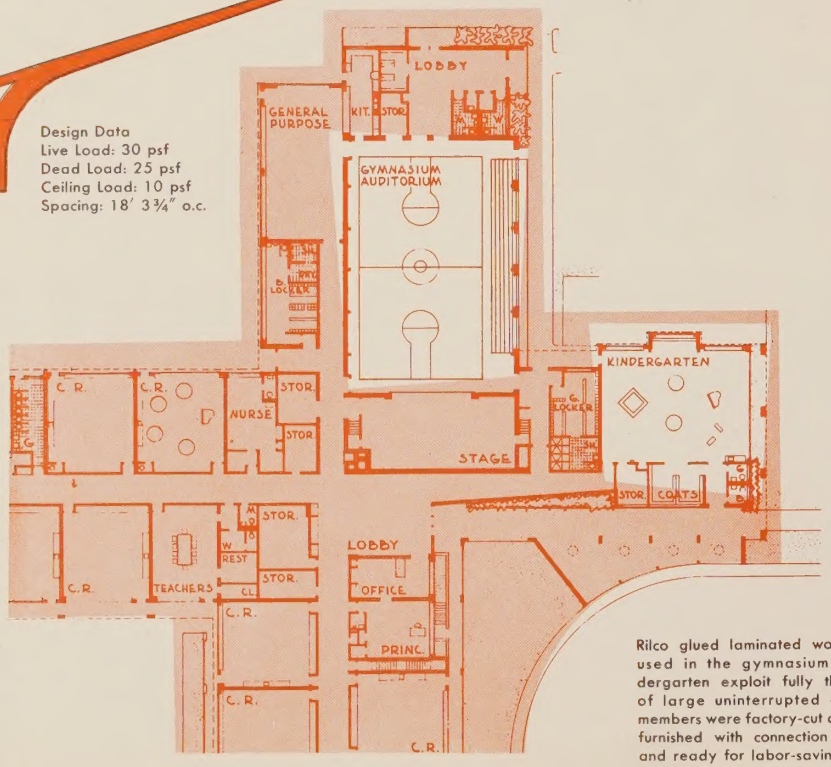
Contractor: Waterbury Construction Co., Waterbury, Connecticut



Structural section at tangent points: 34 ply 1" x 8" (7¼" x 26⅝")

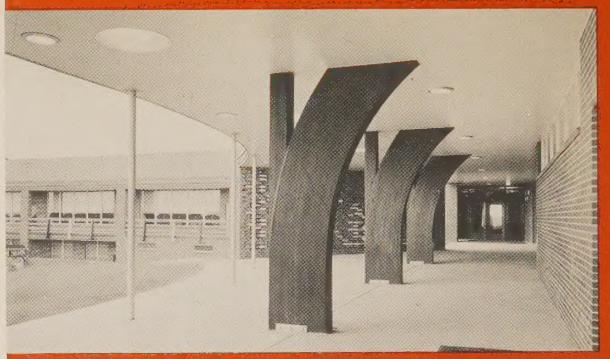


Design Data
Live Load: 30 psf
Dead Load: 25 psf
Ceiling Load: 10 psf
Spacing: 18' 3¾" o.c.



Rilco glued laminated wood arches used in the gymnasium and kindergarten exploit fully the beauty of large uninterrupted areas. All members were factory-cut and drilled, furnished with connection hardware and ready for labor-saving erection.

"We selected laminated wood arches for the combination gymnasium-auditorium in Buck's Hill School because we felt that a form of exposed ceiling would be most economical. By using laminated wood arches and purlins we were able to apply a low cost roof with an acoustical interior finish and have a finished room broken only by the clean lines of the arches." For these reasons architect, Francis L. S. Meyers, designed the Buck's Hill School around laminated wood structural members. The versatility of Rilco arches as a decorative material is further emphasized in the spans under the overhang entrance.



These arches exposed to the elements were bonded with waterproof resorcinal glue.

Rilco arches add warmth and beauty to the kindergarten.

Glued laminated wood arches are of large section and resist collapse, even under high heat.

PAYSON HIGH SCHOOL

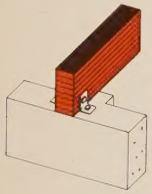
PAYSON, ILLINOIS

Architect: Hafner, Hafner & Stranckmeyer, Quincy, Illinois

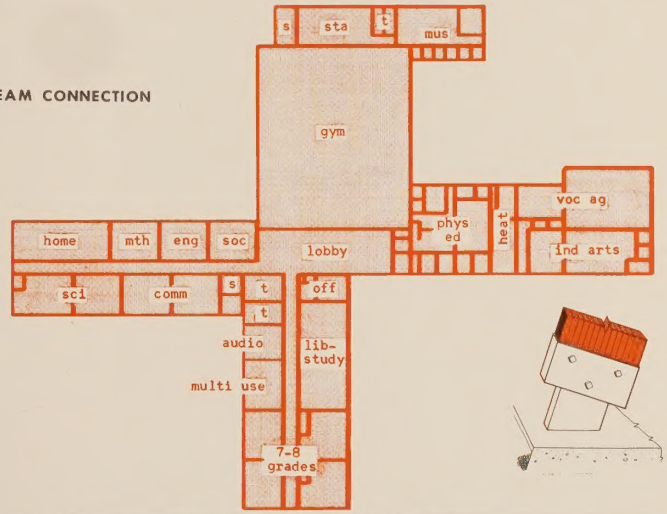
Contractor: Orstrom & Maguire Construction Co., Inc., Galesburg, Illinois

"Client was very pleased." "Has a definite 'quality' appearance secured at economy prices." "Completion time of work was considerably excelled." "Square foot cost of building was substantially reduced by laminated beams.". . . these are statements made by the architect and builder of the Payson High School constructed with Rilco beams and radial arches.

Accurately fabricated Rilco laminated beams and arches are made of kiln dried West Coast Douglas Fir to offer strength and beauty plus adaptable efficient structural shapes.

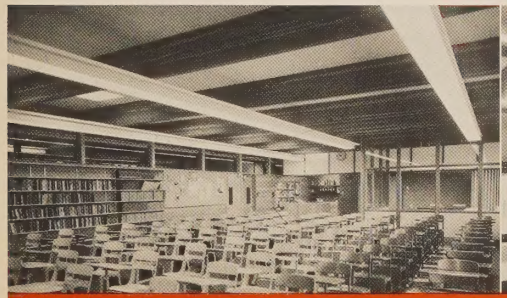


BEAM CONNECTION



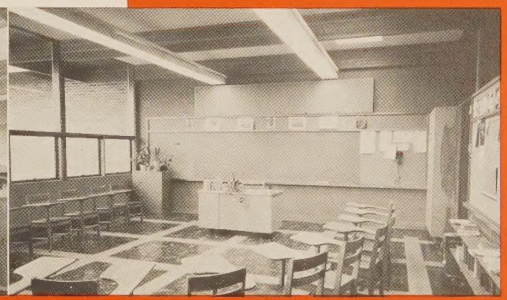
GYMNASIUM ARCH ANCHOR DETAIL

Approximately 800 stadium-type seats are provided in the gymnasium-auditorium constructed with Rilco radial arches. One row of folding chairs around top increases seating capacity to 1,000. Players' entrance is by means of an under-floor tunnel connecting to locker rooms.



30′ x 66′ library and study hall accommodates 100 students.

Office located at main entrance lobby provides excellent control of student locker area.



Classroom walls are of colorfully painted light weight cement blocks. Ceilings have perforated acoustic tile between the Rilco laminated beams. Exterior walls are plate glass above, with push-out vents at the bottom.

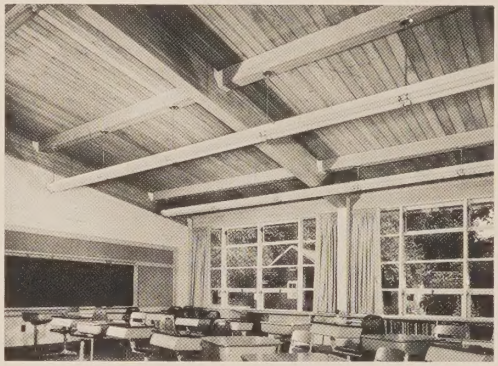
WEBSTER GRADE SCHOOL

PELLA, IOWA

Architect: Smith and Voorhees, Des Moines, Iowa

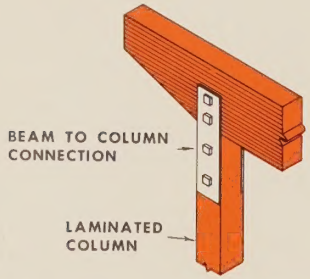
Contractor: Hurley Construction Co., St. Paul, Minnesota

"The cost advantage of the laminated wood," says Grant Voorhees, architect, "was the deciding factor in selection. We found by using glued laminated wood structural members a very appreciable savings in the cost of the school was effected. Of course, the beauty of the natural materials when left exposed added greatly to the pleasing, informal atmosphere which we consider so essential in today's elementary schools." Gene Hurley, contractor, advised, "Rilco really cut erection costs. The beams arrived on the job ready for erection. No specialized crews were necessary; carpenters did all the erection easier with the connectors furnished by Rilco. There was no furring, we just nailed the Rilco Deck to the top of the beams and purlins." Cost comparisons showed *a savings of $500 per schoolroom* over other types of construction materials.

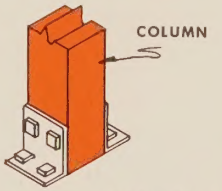


The natural beauty of exposed Rilco laminated beams and roof deck create the pleasing, informal atmosphere considered essential in today's schools.

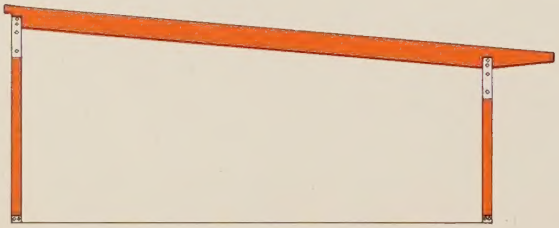
Rilco pitched beams 9″ x 22⅝″ in section span the 42′ gymnasium.



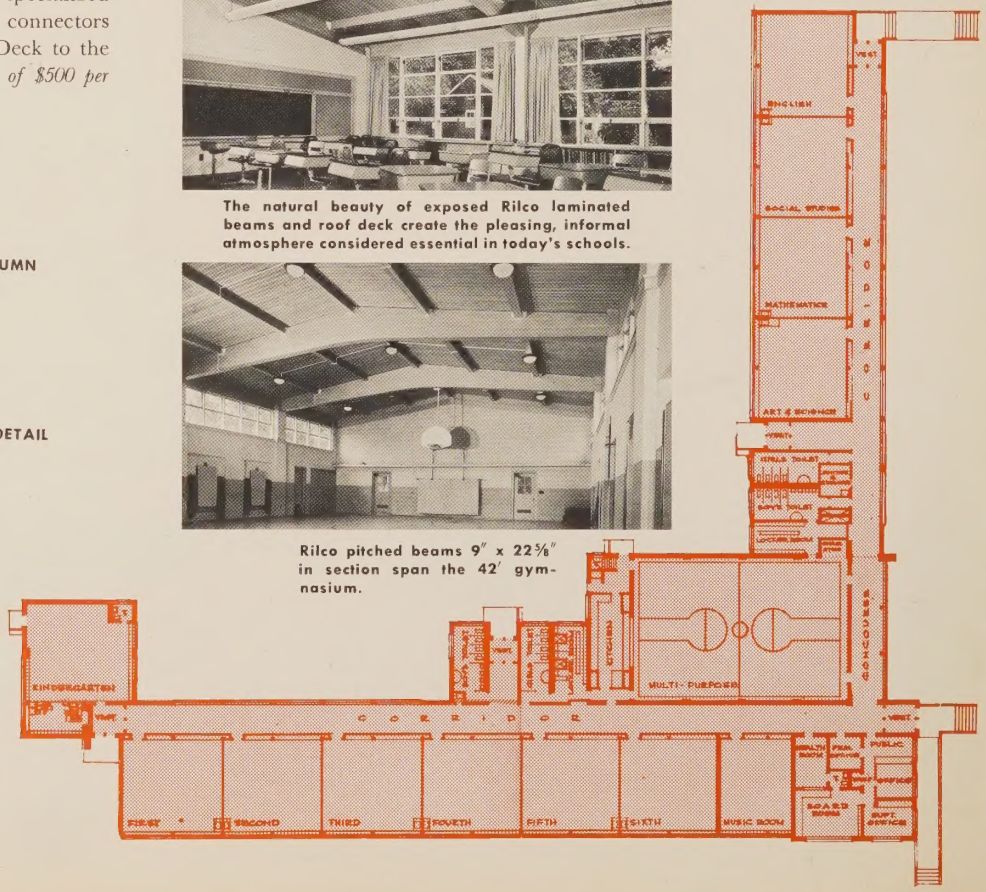
ANGLE AND BOLTS



BASE DETAIL



BEAM AND COLUMN ELEVATION



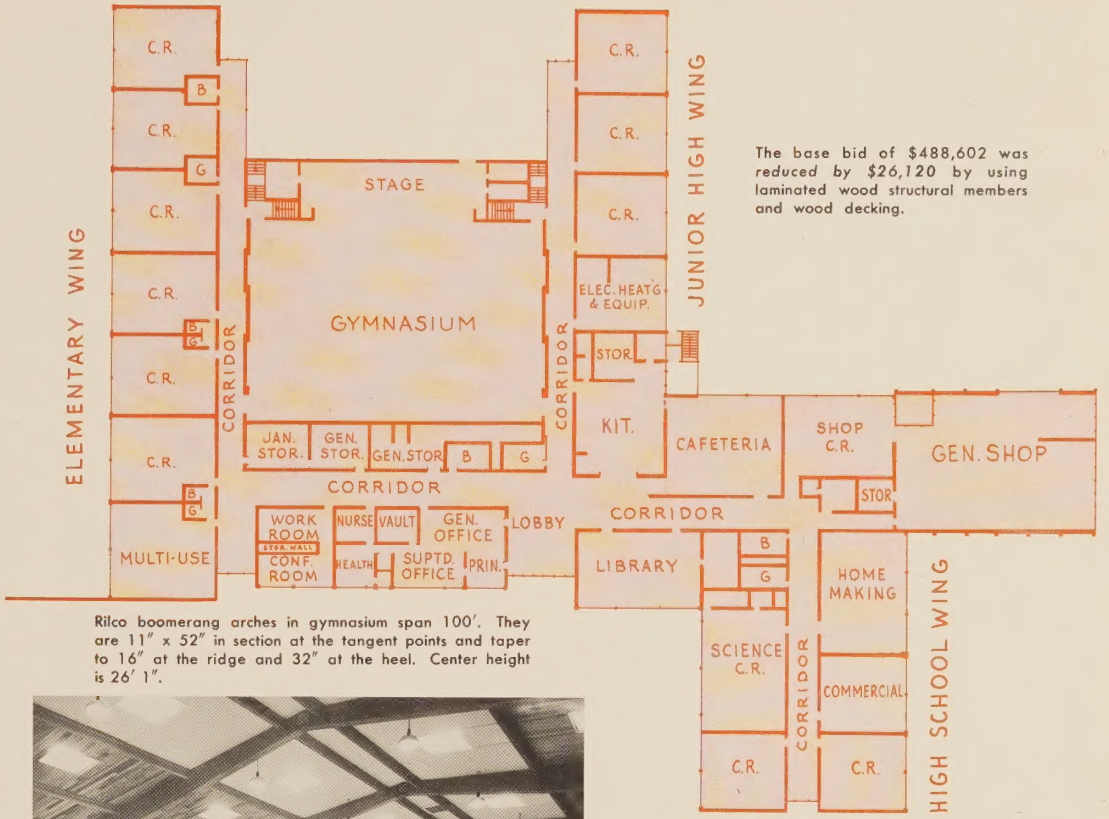
BANNER COUNTY SCHOOL

HARRISBURG, NEBRASKA

Architect: Robert W. Ditzen, Boulder, Colorado

Contractor: Fullen Construction Company

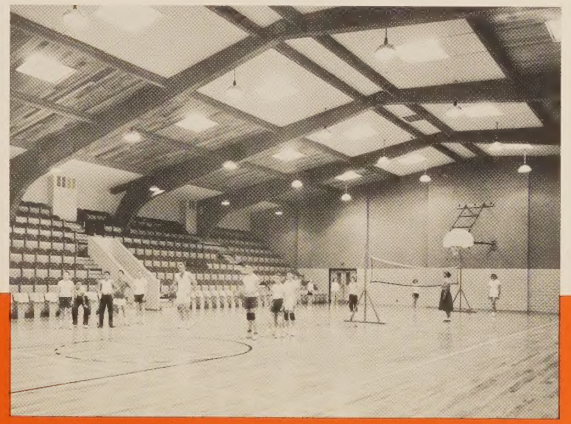
The Banner County School is a good example of how laminated wood reduces school building costs and adds natural beauty and warmth unduplicated by any other building material. The base bid for this school was based on a structural steel frame, spanned with steel decking. The alternate bid, which was accepted, was based on laminated wood columns and beams, spanned with three inch wood decking. The total area of the school is 41,831 sq. ft. The cubage is 568,975 cu. ft. Across the country, other communities like Banner County are finding that modern use of wood makes tax dollars go farther by reducing costs of new schools.



The base bid of $488,602 was *reduced by $26,120* by using laminated wood structural members and wood decking.

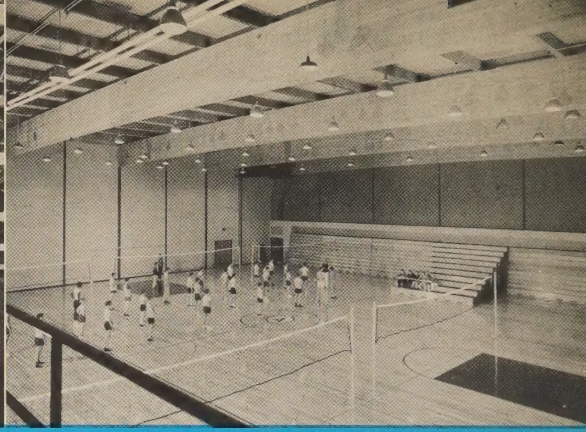
A total of 119 Rilco glued laminated wood beams, 72 laminated columns, 4 boomerang arches and 40 laminated purlins were used in the construction of the Banner County School.

Rilco boomerang arches in gymnasium span 100′. They are 11″ x 52″ in section at the tangent points and taper to 16″ at the ridge and 32″ at the heel. Center height is 26′ 1″.

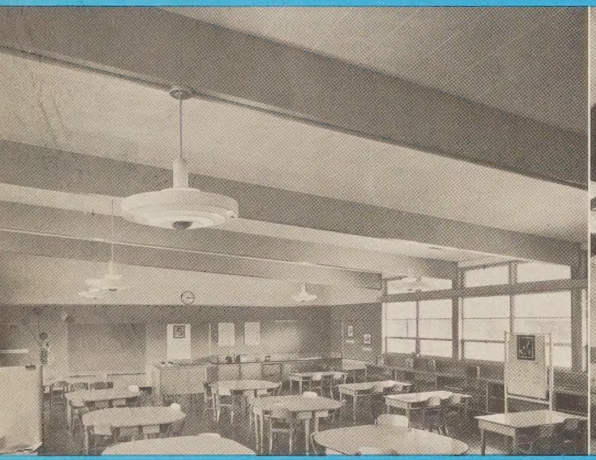


Sculptors Studio, Notre Dame University. Rilco laminated wood roof supports are 5″ x 12″ and spaced 12′ 4″ o. c. and covered with Rilco Deck of solid Western Red Cedar. Architects: Ellerbe & Company, St. Paul, Minnesota.

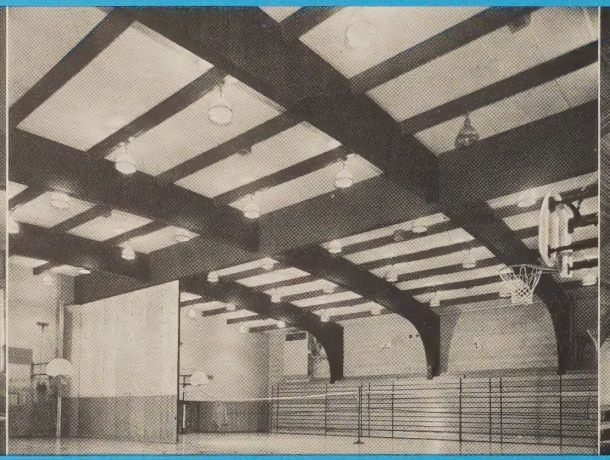
Riding School Building, Valley Forge Military Academy, Wayne, Pennsylvania. Rilco Trusses, 122′ 11″ in span are spaced 20′ o. c. The building is 140′ wide and 350′ long. Architect: Harold Wilson, Ardmore, Pennsylvania.



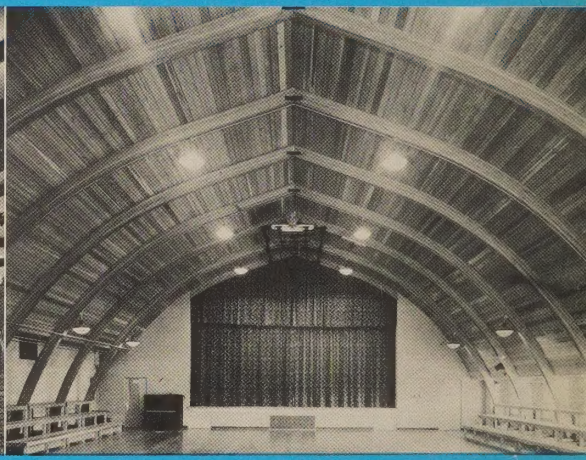
Astoria High School, Astoria, Oregon. Gymnasium beams are 107′ in span and 12½″ x 56⅞″ in section. Rilco beams were also used throughout other portions of the school. Architects: E. E. Isaacson, Stewart & Richardson, Portland, Oregon.



One of four schools in the Ontario, California school district for which Rilco supplied 314 beams in lengths from 42′ to 48′. Architect: Jay Dewey Harnish, Ontario, California.



Brookfield High School Gymnasium, Brookfield, Wisconsin. Constructed with Rilco two-hinged arches 100′ 4″ in span, spaced 7′ 2″ o. c. Arch section is 11″ x 46⅞″. Architects: Grassold-Johnson & Associates, Milwaukee, Wisconsin.



Easton School Gymnasium, Easton, Missouri. Constructed with Rilco Utility Arches 56′ 2″ in span and spaced 8′ o. c. Architect: V. Preston Terrell, Kansas City, Missouri.

RILCO
WORKS WONDERS WITH WOOD

RILCO LAMINATED PRODUCTS, INC.

W-891 First Nat'l Bank Bldg.
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Newark 2, N. J.

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Fort Wayne, Ind.

233 Tacoma Building
Tacoma 1, Wash.

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